Cassini Saturn Orbit Insertion Timeline - 2004

Colors: yellow = maneuvers; blue = geometry; red = SOI-related; green = data playbacks

Orbiter UTC	Ground UTC	Pacific Time	Time wrt SOI	Activity	Description
175T00:00	**Jun 23 01:23**	**Tue Jun 22 06:23 PM**	**SOI-08d01h**	**Activate SOI critical sequence and begin quiet period**	**8-day period of minimal spacecraft activity begins; Solid State Recorders (SSRs) set to SOI configuration**
181T19:00	Jun 29 20:24	Tue Jun 29 01:24 PM	SOI-01d06h	Orbiter transitions to SOI telemetry mode	Dual record of engineering on both Solid State Recorders (SSRs) begins; only real-time engineering at 1896 bps downlinked
181T20:00	Jun 29 21:24	Tue Jun 29 02:24 PM	SOI-01d05h	Begin critical commanding for SOI	Critical sequence begins issuing commands for SOI (burn start - 29 hours)
182T23:27	Jul 01 00:51	Wed Jun 30 05:51 PM	SOI-01h45m	Transition to Low-Gain Antenna 1 (LGA-1) communication	Telemetry is turned off; carrier only for SOI communication
182T23:47	Jul 01 01:11	Wed Jun 30 06:11 PM	SOI-01h25m	Turn to protective attitude for ascending ring-plane crossing	Protects spacecraft from dust encountered in ring plane; turn takes 10 min
183T00:47	**Jul 01 02:11**	**Wed Jun 30 07:11 PM**	**SOI-00h25m**	**Ascending ring-plane crossing**	**Distance = 158,500 km (98,500 miles); High-Gain Antenna (HGA) is oriented to dust ram direction**
183T00:57	Jul 01 02:21	Wed Jun 30 07:21 PM	SOI-00h15m	Turn to burn attitude	Turn takes 10 min; 6 min spare time after turn completion before burn start
183T01:11	Jul 01 02:35	Wed Jun 30 07:35 PM	SOI-00h01m	Open latch valves	Valves opened in preparation for pressurized burn
183T01:12	**Jul 01 02:36**	**Wed Jun 30 07:36 PM**	SOI-00h00m	**Saturn Orbit Insertion burn start**	**Main engine maneuver, velocity change = 626 m/s (1400 mph); 96 minute burn**
183T01:35	Jul 01 02:59	Wed Jun 30 07:59 PM	SOI+00h23m	Cassini passes behind Saturn's F ring as seen from Earth	Communication still likely
183T01:42	Jul 01 03:06	Wed Jun 30 08:06 PM	SOI+00h30m	Cassini passes behind Saturn's A ring as seen from Earth	Communication unlikely for 25 minutes
183T02:07	Jul 01 03:31	Wed Jun 30 08:31 PM	SOI+00h55m	Cassini passes behind Cassini division as seen from Earth	Brief communication possible for 6 minutes
183T02:13	Jul 01 03:37	Wed Jun 30 08:37 PM	SOI+01h01m	Cassini passes behind Saturn's B ring as seen from Earth	Communication unlikely for 28 minutes
183T02:30	Jul 01 03:54	Wed Jun 30 08:54 PM	SOI+01h18m	Saturn orbit achieved	Spacecraft has slowed enough to be captured by Saturn's gravity and is no longer in escaping orbit (78 min into burn)
183T02:39	**Jul 01 04:03**	**Wed Jun 30 09:03 PM**	**SOI+01h27m**	**Closest approach to Saturn in entire mission**	**Distance = 80,230 km (49,850 miles) from center of Saturn, 19,980 km (12,400 miles) from cloud tops**
183T02:41	Jul 01 04:05	Wed Jun 30 09:05 PM	SOI+01h29m	Cassini passes behind Saturn's C ring as seen from Earth	Communication restored until science turns (C ring is less opaque to Cassini radio freqs than A or B ring)
183T02:48	**Jul 01 04:12**	**Wed Jun 30 09:12 PM**	**SOI+01h36m**	**Saturn Orbit Insertion nominal burn end**	
183T02:51	Jul 01 04:15	Wed Jun 30 09:15 PM	SOI+01h39m	Reconfigure radio comm, close main engine cover, begin turn to Earth-point	Main engine cover is closed to protect engine nozzles during descending ring plane crossing; will shift if burn ends late
183T02:54	Jul 01 04:18	Wed Jun 30 09:18 PM	SOI+01h42m	Spacecraft on Earth-point	Will shift if burn ends late
183T02:57	**Jul 01 04:21**	**Wed Jun 30 09:21 PM**	**SOI+01h45m**	**Nominal end of critical sequence; main engine cover fully closed**	**Will shift if burn ends late**
183T02:58	Jul 01 04:22	Wed Jun 30 09:22 PM	SOI+01h46m	Saturn Orbit Insertion max burn end	
183T03:00	Jul 01 04:24	Wed Jun 30 09:24 PM	SOI+01h48m	Cassini passes behind Saturn's D ring as seen from Earth	Communication remains likely (D ring is less opaque to Cassini radio frequencies than A or B ring)
183T03:06	Jul 01 04:30	Wed Jun 30 09:30 PM	SOI+01h54m	Max end of critical sequence	Background sequence takes over spacecraft control
183T03:06	Jul 01 04:30	Wed Jun 30 09:30 PM	SOI+01h54m	Switch to High-Gain Antenna (HGA) communication	Telemetry resumes; 1896 bits per second real-time engineering data transmitted
183T03:07	Jul 01 04:31	Wed Jun 30 09:31 PM	SOI+01h55m	Turn off Earth-line for post-burn science observations	Background sequence turns spacecraft to view rings and magnetosphere; communication not possible
183T03:15	Jul 01 04:39	Wed Jun 30 09:39 PM	SOI+02h03m	Jettison INMS cover	Ion & Neutral Mass Spectrometer (INMS) cover is removed for post-SOI observations
183T03:30	Jul 01 04:54	Wed Jun 30 09:54 PM	SOI+02h18m	Cassini passes behind Saturn's C ring as seen from Earth	Cassini should be in science attitudes and will not be communicating with Earth; otherwise communication possible
183T03:33	Jul 01 04:57	Wed Jun 30 09:57 PM	SOI+02h21m	Cassini passes behind Saturn as seen from Earth	Cassini should be in science attitudes and will not be communicating with Earth; otherwise communication not possible
183T04:08	Jul 01 05:32	Wed Jun 30 10:32 PM	SOI+02h56m	Turn to protective attitude for descending ring-plane crossing	
183T04:09	Jul 01 05:33	Wed Jun 30 10:33 PM	SOI+02h57m	Cassini emerges from behind Saturn (and is behind A ring)	Cassini should be in science attitudes and will not be communicating with Earth; otherwise communication not likely
183T04:20	Jul 01 05:44	Wed Jun 30 10:44 PM	SOI+03h08m	Cassini emerges from behind A ring as seen from Earth	Cassini should be in science attitudes and will not be communicating with Earth; otherwise communication possible
183T04:34	**Jul 01 05:58**	**Wed Jun 30 10:58 PM**	**SOI+03h22m**	**Descending ring-plane crossing**	**Distance = 158,500 km (98,500 miles); HGA is oriented to dust ram as directed by background sequence**
183T05:36	**Jul 01 07:00**	**Thu Jul 01 12:00 AM**	**SOI+04h24m**	**Spacecraft returns to Earth-point; SOI data playback begins**	**Double playback of SOI science & engineering data for 19.5 hours; data played back over Madrid, then Goldstone**
183T05:48	Jul 01 07:12	Thu Jul 01 12:12 AM	SOI+04h36m	Open main engine cover	Main engine cover is opened for upcoming post-SOI maneuver
183T09:25	Jul 01 10:49	Thu Jul 01 03:49 AM	SOI+08h13m	Switch to reaction wheel control	Spacecraft has been controlled with thrusters since before SOI; now reaction wheel control is appropriate
183T11:15	**Jul 01 12:39**	**Thu Jul 01 05:39 AM**	**SOI+10h03m**	**First SOI images returned**	**Post-SOI images of Saturn and rings are retrieved from recorders**